



TFR2 gene

transferrin receptor 2

Normal Function

The *TFR2* gene provides instructions for making a protein called transferrin receptor 2. Studies suggest that this receptor helps iron enter liver cells (hepatocytes). In the blood, iron binds to a protein called transferrin for transport and delivery to the liver and other tissues. On the cell surface, transferrin binds to transferrin receptor 2, and iron is allowed to enter the cell. Additionally, this receptor helps sense and regulate iron storage levels in the body by controlling the levels of another protein called hepcidin. Hepcidin is a protein that determines how much iron is absorbed from the diet and released from storage sites in the body in response to iron levels.

Health Conditions Related to Genetic Changes

hereditary hemochromatosis

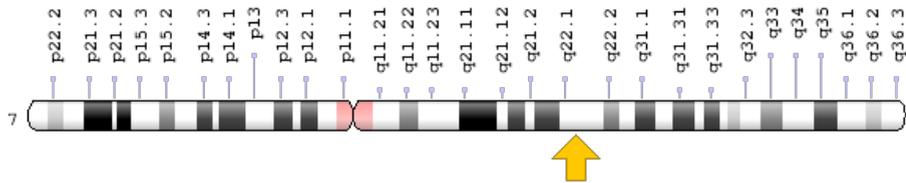
At least nine mutations that cause a form of hereditary hemochromatosis designated as type 3 have been identified in the *TFR2* gene. Some mutations in the *TFR2* gene prevent the production of transferrin receptor 2. Other mutations result in proteins that have an incorrect sequence of protein building blocks (amino acids) or proteins that are too short to function normally. These mutations likely impair the ability to regulate importation of iron into certain cells.

Mutations in the *TFR2* gene are also thought to contribute to low levels of hepcidin in the body, which allows too much iron to be absorbed from the diet. When this occurs, the excess iron is stored in the body's tissues, especially the liver. Iron overload leads to the organ damage and other signs and symptoms of type 3 hemochromatosis.

Chromosomal Location

Cytogenetic Location: 7q22.1, which is the long (q) arm of chromosome 7 at position 22.1

Molecular Location: base pairs 100,620,416 to 100,642,780 on chromosome 7 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- HFE3
- TFR2_HUMAN
- Transferrin Receptor Protein 2

Additional Information & Resources

GeneReviews

- TFR2-Related Hereditary Hemochromatosis
<https://www.ncbi.nlm.nih.gov/books/NBK1349>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28TFR2%5BTIAB%5D%29+OR+%28transferrin+receptor+2%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D>

OMIM

- TRANSFERRIN RECEPTOR 2
<http://omim.org/entry/604720>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
http://atlasgeneticsoncology.org/Genes/GC_TFR2.html
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=TFR2%5Bgene%5D>
- HGNC Gene Symbol Report
http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=11762
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/7036>
- UniProt
<http://www.uniprot.org/uniprot/Q9UP52>

Sources for This Summary

- Beutler E, Hoffbrand AV, Cook JD. Iron deficiency and overload. Hematology Am Soc Hematol Educ Program. 2003;40-61. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/14633776>
- Camaschella C, Roetto A, Cali A, De Gobbi M, Garozzo G, Carella M, Majorano N, Totaro A, Gasparini P. The gene TFR2 is mutated in a new type of haemochromatosis mapping to 7q22. Nat Genet. 2000 May;25(1):14-5.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/10802645>
- Camaschella C. Why do humans need two types of transferrin receptor? Lessons from a rare genetic disorder. Haematologica. 2005 Mar;90(3):296.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15749659>
- Deaglio S, Capobianco A, Cali A, Bellora F, Alberti F, Righi L, Sapino A, Camaschella C, Malavasi F. Structural, functional, and tissue distribution analysis of human transferrin receptor-2 by murine monoclonal antibodies and a polyclonal antiserum. Blood. 2002 Nov 15;100(10):3782-9. Epub 2002 Jul 5.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/12393650>
- Deicher R, Hörl WH. New insights into the regulation of iron homeostasis. Eur J Clin Invest. 2006 May;36(5):301-9. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/16634833>
- Fleming RE, Sly WS. Mechanisms of iron accumulation in hereditary hemochromatosis. Annu Rev Physiol. 2002;64:663-80. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/11826284>
- Fleming RE. Advances in understanding the molecular basis for the regulation of dietary iron absorption. Curr Opin Gastroenterol. 2005 Mar;21(2):201-6. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15711214>
- Frazer DM, Anderson GJ. The orchestration of body iron intake: how and where do enterocytes receive their cues? Blood Cells Mol Dis. 2003 May-Jun;30(3):288-97. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/12737947>

- Le Gac G, Mons F, Jacolot S, Scotet V, Férec C, Frébourg T. Early onset hereditary hemochromatosis resulting from a novel TFR2 gene nonsense mutation (R105X) in two siblings of north French descent. *Br J Haematol.* 2004 Jun;125(5):674-8.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15147384>
 - McGregor J, McKie AT, Simpson RJ. Of mice and men: genetic determinants of iron status. *Proc Nutr Soc.* 2004 Feb;63(1):11-20.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15070436>
 - Pietrangelo A. Hereditary hemochromatosis--a new look at an old disease. *N Engl J Med.* 2004 Jun 3;350(23):2383-97. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15175440>
 - Pietrangelo A. Non-HFE hemochromatosis. *Semin Liver Dis.* 2005 Nov;25(4):450-60. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/16315138>
 - Roetto A, Daraio F, Alberti F, Porporato P, Calì A, De Gobbi M, Camaschella C. Hemochromatosis due to mutations in transferrin receptor 2. *Blood Cells Mol Dis.* 2002 Nov-Dec;29(3):465-70.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/12547237>
 - Trinder D, Baker E. Transferrin receptor 2: a new molecule in iron metabolism. *Int J Biochem Cell Biol.* 2003 Mar;35(3):292-6. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/12531241>
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